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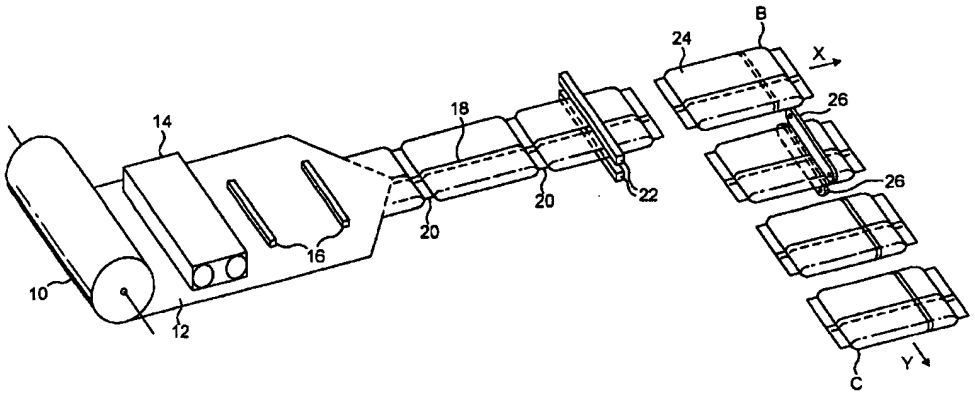
(54) Title: RECLOSABLE BAG PRODUCTION



(57) Abstract: The bags are produced on a form-fill-seal machine operating horizontally or vertically. Zipper strips (16) are initially attached to a continuous web (12) which is subsequently formed into a continuous run of bags having end seals (20) and a back seal (18). The continuous run is separated into individual bags and the zipper strips finally attached to the bag walls by application of heat and/or pressure by a belt sealer (26) operating in a direction perpendicular to that of movement of the continuous web.

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RECLOSABLE BAG PRODUCTION

This invention relates to the production of reclosable bags which have a reclosable seal formed by releasable and engagable zipper strips attached to opposed walls of the bag.

The reclosable seal is often provided adjacent a non-reclosable seal, for example a heat seal, and allows the bag to be reclosed with the non-reclosable seal has been opened. Such bags are often formed by use of a horizontal or a vertical form-fill-seal machine.

In preparing continuous web material for supply to a form-fill-seal machine, or other apparatus for forming bags having reclosable seals, a continuous length of web material from which the bags are to be formed is advanced in a longitudinal direction and separate lengths of zipper strip are applied to the web so that they are at spaced intervals longitudinally of the web and extend transversely (usually perpendicularly) to the longitudinal direction. Each zipper strip length comprises first and second interengagable profiles which are pre-assembled into at least partial engagement with each other. This is known as "cross-web technology": see our published UK patent application GB-A-2349603 which describes a form-fill-seal machine using that technology and the entire contents of which are incorporated herein by reference. Figure 5 of GB-A-2349603 shows the use of a pair of spring-loaded zipper sealing jaws which operate to seal the zipper strips to the walls of the bag simultaneously with formation of the non-reclosable end seal of the bag. This operation requires a certain time as it is necessary for the zipper sealing jaws to supply heat to the zipper strips to seal them to the bag walls. The step therefore slows down the entire form-fill-seal operation.

According to the present invention, there is provided a method of making a reclosable bag, comprising the steps of:

supplying a continuous web of bag-forming material in a

first direction to a bag-forming station;

attaching to the continuous web a plurality of zipper strips at intervals spaced in the first direction and extending transversely of the web, each zipper strip comprising first and second interengagable profiles pre-assembled into at least partial engagement with each other;

forming end-sealed bags at the bag-forming station, each bag having opposed first and second walls, at least one of which is formed from the said continuous web of material, first and second end seals, and therebetween at least one of the zipper strips attached to a respective wall of the bag; and

treating the bags adjacent the respective zipper strip profiles in order to secure the profiles to the first and second walls respectively and to form an openable and reclosable seal inside the bags.

In a method according to the present invention, the respective zipper strip profiles are not finally attached to the bag walls until after the bag has been formed.

In a preferred form of the invention, the zipper strips are initially attached to the continuous web only sufficiently to hold them in position: final securement takes place only after formation of the bag.

The step of treatment of the walls of the bag to secure the zipper profiles may take place before or after the web has been separated into individual bags but preferably takes place after separation of the continuous web into individual bags.

Initial attachment and/or securement of the zipper strip profiles to the bag walls can be by means of pressure-sensitive or heat-sensitive adhesive, by fusing of the material of the bags and/or the strips under the application of heat and/or pressure, or by any other suitable means. The means for initial attachment and for subsequent securement may be the same or different.

Separation of the continuous web into individual bags

prior to the securement of the zipper strips to the bag walls allows securement to take place at a securement station prior to which the bags are reorientated so that they are fed to the securement station with their zipper strips aligned along a common axis.

The common axis may be parallel to the direction of supply of the continuous web but is preferably transverse to that direction, most preferably perpendicular thereto.

Preferably, the bags are treated by the application of heat and/or pressure to secure the zipper-strip profiles to the bags.

Conveniently, the bags are treated by a belt sealer.

Advantageously, the direction of supply of the continuous web is substantially horizontal and the common axis is substantially horizontal.

Preferably, the direction of supply of the continuous web is substantially vertical and the common axis is substantially horizontal.

The invention also provides an apparatus for making a reclosable bag, the apparatus comprising successively:

means for supplying a continuous web of bag-forming material in a first direction:

means for attaching to the continuous web a plurality of zipper strips at intervals spaced in the first direction and extending transversely of the web, each zipper strip comprising first and second interengagable profiles pre-assembled into at least partial engagement with each other;

a bag-forming station at which are formed bags having opposed first and second walls, at least one of which is formed from the continuous web of material, first and second end seals and therebetween and attached to a respective wall of the bag at least one of the zipper strips; and

means for treating the bags adjacent the respective zipper strip profiles to secure the profiles to the first and second walls respectively and to form an openable and

reclosable seal inside the bags.

Preferably, the apparatus comprises means located between the bag-forming station and the securement means for separating the continuous web into individual bags.

Advantageously, the apparatus comprises means located between the separating means and the securement means for reorientating the separated bags so that their respective zipper strips are aligned one with another along a common axis.

The securement means preferably comprises means for conveying the bags through a treatment zone, where the bags are treated with heat and/or pressure, or otherwise, to secure the zipper-strip profiles to the walls of the bags.

The conveying means advantageously engage the zipper-strip profiles, whilst making contact with the respective outer surfaces of the walls of the bags.

Preferably, the conveying means also effect the treatment to secure the profiles to the bag walls. Conveniently, this is achieved by application of heat and/or pressure by way of the conveying means, for example by the conveying means comprising a belt sealer.

In the present invention, separation of the individual bags and reorientation of the bags before securement of the zipper strips allows the rate of bag production to be high because the zipper strips can be secured in a shorter time period than could be achieved by securement whilst the bags still formed a continuous web.

An embodiment of the invention will now be described by way of example with reference to the drawing of this specification, in which:

Figure 1 is a somewhat schematic drawing of a horizontal form-fill-seal apparatus using cross-web technology;

Figure 2 is a longitudinal sectional view of a bag at an intermediate stage in the production of bags using the apparatus of figure 1, the bag being as at the stage indicated

by the letter "B" in figure 1;

Figure 3 is a view similar to figure 2 but showing the finished bag, as at the stage indicated by the letter "C" in figure 1; and

Figure 4 is a schematic drawing of a vertical form-fill-seal apparatus using cross-web technology.

Referring to figure 1, this shows a storage roll 10 of web material 12, for example polyethylene. The web material 12 is advanced from the roll 10 past a cross-web applicator 14 at which lengths of zipper 16 are attached to the web at spaced intervals in the direction of advancement of the web, shown by the arrow "X" in figure 1. The cross-web applicator is preferably as described in our copending International Patent Application PCT/GB2003/002158 (the entire contents of which are incorporated herein by reference), claiming priority from UK Application 0211573.1 but any suitable apparatus may be used, for example that described in GB-A-2349603 referred to above.

Each length of zipper consists of a first and a second interengagable profile, which are respectively "male" and "female" in cross-sectional shape. Each profile has a respective surface for attachment to the web material. An example of suitable zipper profiles can be seen in our published International Patent Application WO-A-02/06040 (the entire contents of which are incorporated herein by reference). The attachment surfaces extend in spaced parallel planes when the profiles are in engagement with each other. As seen in figure 1, the lengths of zipper 16 are attached to the web 12 by the formation of a tack seal between the flange of one zipper profile an the web material 12. Each length of zipper 16 is approximately one-half the width of the web material 12. The lengths are positioned approximately mid-way between the longitudinal edges of the web material.

After application of the lengths of zipper 16, the web material 12 is formed into a tubular shape by the form-fill-

seal apparatus. This is shown only schematically in figure 1. In this operation, the longitudinal edges of the web material 12 are brought together to form a back seal 18 which is made by the action of heated clamping bars (not shown). Similarly, transverse end seals 20 are formed by the action of further heated clamping bars 22. During this operation, product is introduced into the bags being formed. The means for doing this are not shown in figure 1 but they are well-known in the field of form-fill-seal apparatus. Formation of the back seal 18 and the end seals 20 produces a continuous length of bags which is then cut into separate individual bags 24 by cutting means (again not shown but well-known in the field of form-fill-seal apparatus).

An individual bag as first produced is shown by the letter "B" in figure 1 and in longitudinal section in figure 2.

Figure 2 shows the bag to have an end seal 20 at each end and a length of zipper 16 tack-sealed to one wall of the bag inside the bag and adjacent one of the end seals 20. The tack-seal of the length of zipper 16 to the material of the bag is between the outer surface of one zipper profile and the bag. The other zipper profile is engaged with the first zipper profile, at least to the extent necessary to hold the profiles in the correct alignment for their engagement. Normally, the profiles will be fully engaged.

After the continuous length of bags has been cut into individual bags 24, the bags are moved laterally from the direction of advancement of the web 12, shown by the arrow "X" in figure 1, into a line perpendicular thereto and shown by the arrow "Y" in figure 1.

After lateral movement of the bags 24 into the direction of the arrow "Y" the bags are engaged by a belt sealer comprising a pair of heated gripping guides 26. One of the guides 26 engages the outer surface of the bag 24 immediately adjacent the respective zipper profile which is tack-sealed

to the inner surface of the bag. The relatively stiff zipper profile facilitates this engagement between the respective guide 26 and the bag 28. At the same time, the other guide 26 engages the other zipper profile through the material of the bag.

The engagement of the guides 26 with the zipper 16 through the material of the bag not only allows the bags to be conveyed further in the direction of arrow "Y" but also effects complete sealing of the zipper profiles to the respective inner surfaces of the walls of the bag. This complete sealing can be brought about by heat or pressure, or by both, or by any other suitable means. At the same time, the zipper profiles are, if not already, brought into complete engagement with each other.

The final bag 28 is shown by the letter "C" in figure 1 and in longitudinal section in figure 3. It will be seen from figure 3 that the final bag has non-reclosable end seals 20 and a reclosable seal formed by the zipper 16 inside the bag. This allows the bag to be resealed by means of the zipper 16 after it has been opened by opening the non-reclosable end seal 20 adjacent the zipper 16.

The present invention is equally applicable to vertical form-fill-seal machines and to methods operated on such machines, as can be seen from the embodiment shown in figure 4.

In figure 4, an apparatus for forming, filling and sealing bags in the vertical direction is shown which works in a substantially similar way to that shown in figure 1 and described above. A storage roll 28 feeds web material 30 past a cross-web applicator 32 which attaches lengths of zipper 34 at spaced intervals. The web material 30 is formed into a tubular shape around the vertical form-fill-seal apparatus 36. As described above, the web material 30 is formed, filled, sealed and separated to give individual bags, such as bag 38. This whole process is performed in the vertically downward

direction shown as "V". Once the bags are separated, they are moved in the horizontal direction "H" perpendicular to the direction "V". The bags are then passed through a belt sealer comprising a pair of heated gripping guides 42. As shown in figure 4, the outer surfaces of bag 40 are gripped between the guides 42 which both complete sealing of the zipper profiles to the respective inner surfaces of the walls of the bag 40 and direct the bag 40 in the direction "H". As mentioned above, this process also ensures that the zipper profiles are brought into complete engagement with each other, to give a completed sealed bag 44.

It will be noted that, in the bag production method of the invention, the sealed bag (as in figure 2) is first formed with the zipper attached to only one wall thereof. The zipper is attached to the other wall after formation of the sealed bag.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification, as indicating the scope of the invention.

CLAIMS

1. A method of making a reclosable bag, comprising the steps of:

supplying a continuous web of bag-forming material in a first direction to a bag-forming station;

attaching to the continuous web a plurality of zipper strips at intervals spaced in the first direction and extending transversely of the web, each zipper strip comprising first and second interengagable profiles pre-assembled into a least partial engagement with each other;

forming end-sealed bags at the bag-forming station, each bag having opposed first and second walls, at least one of which is formed from the said continuous web of material, first and second end seals, and therebetween at least one of the zipper strips attached to a respective wall of the bag; and

treating the bags adjacent the respective zipper strip profiles in order to secure the profiles to the first and second walls respectively and to form an openable and reclosable seal inside the bags.

2. A method according to claim 1, in which the zipper strips are initially attached to the continuous web only sufficiently to hold them in position, final securement taking place in the said step of treating the bags.

3. A method according to claim 1 or 2, in which the step of treating the bags takes place after the web has been separated into individual bags.

4. A method according to claim 3, in which the treating step takes place at a securement station, prior to which the bags are reorientated so that they are fed to the securement station with their zipper strips aligned along a common axis.

5. A method according to claim 4, in which the common axis is transverse to the direction of supply of the continuous web.

6. A method according to any preceding claim, in which the bags are treated by the application of heat and/or pressure to secure the zipper-strip profiles to the bags.

7. A method according to any preceding claim, wherein the bags are treated by a belt sealer.

8. A method according to any preceding claim, wherein the direction of supply of the continuous web is substantially horizontal and the common axis is substantially horizontal.

9. A method according to any of claims 1 to 7, wherein the direction of supply of the continuous web is substantially vertical and the common axis is substantially horizontal.

10. An apparatus for making a reclosable bag, the apparatus comprising successively:

means for attaching to the continuous web a plurality of zipper strips at intervals spaced in the first direction and extending transversely of the web, each zipper strip comprising first and second interengagable profiles pre-assembled into a least partial engagement with each other;

a bag-forming station at which are formed bags having opposed first and second walls, at least one of which is formed from the continuous web of material, first and second end seals and therebetween and attached to a respective wall of the bag at least one of the zipper strips; and

means for treating the bags adjacent the respective zipper strip profiles to secure the profiles to the first and second walls respectively and to form an openable and reclosable seal inside the bags.

11. An apparatus according to claim 10, comprising means located between the bag-forming station and the treatment means for separating the continuous web into individual bags.

12. An apparatus according to claim 11, comprising means located between the separating means and the treatment means for reorientating the separated bags so that their respective zipper strips are aligned one with another along a common axis.

13. An apparatus according to any of claims 10, 11 or 12, in which the common axis is transverse to the direction of supply of the continuous web.

14. An apparatus according to claim 11, 12 or 13, in which the treatment means comprises means for conveying the bags through a treatment zone where the bags are treated to secure the zipper-strip profiles to the walls of the bags.

15. An apparatus according to claim 14, in which the conveying means engage the zipper-strip profiles, whilst making contact with the respective outer surfaces of the walls of the bags.

16. An apparatus according to claim 15, in which the conveying means effect the treatment to secure the profiles to the bag walls.

17. An apparatus according to claim 16, in which the conveying means comprise a belt sealer.

18. An apparatus according to any of claims 10 to 17, in which the means for treating the bags apply heat and/or pressure to secure the zipper-strip profiles to the bags.

19. An apparatus according to any of claims 10 to 18, wherein the direction of supply of the continuous web is substantially horizontal and the common axis is substantially horizontal.

20. An apparatus according to any of claims 10 to 18, wherein the direction of supply of the continuous web is substantially vertical and the common axis is substantially horizontal.

21. A method of making a reclosable bag, the method being substantially as hereinbefore described with reference to the drawings.

22. A reclosable bag made by a method according to any of the claims 1 to 9 and 21.

23. A reclosable bag substantially as hereinbefore described with reference to the drawings.

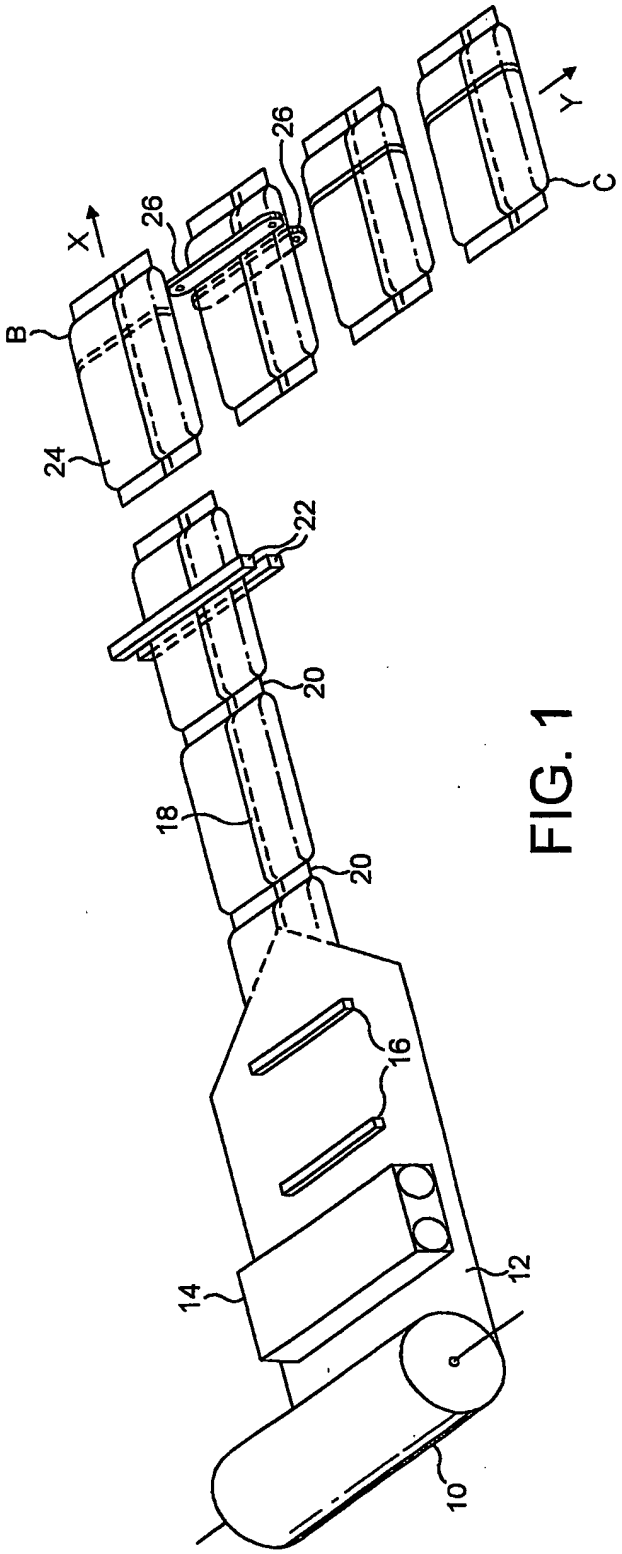

FIG. 1

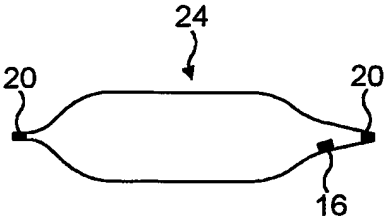

FIG. 2

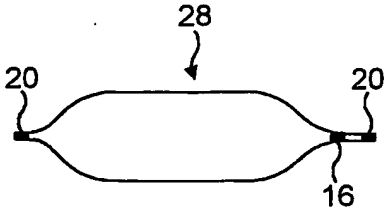

FIG. 3

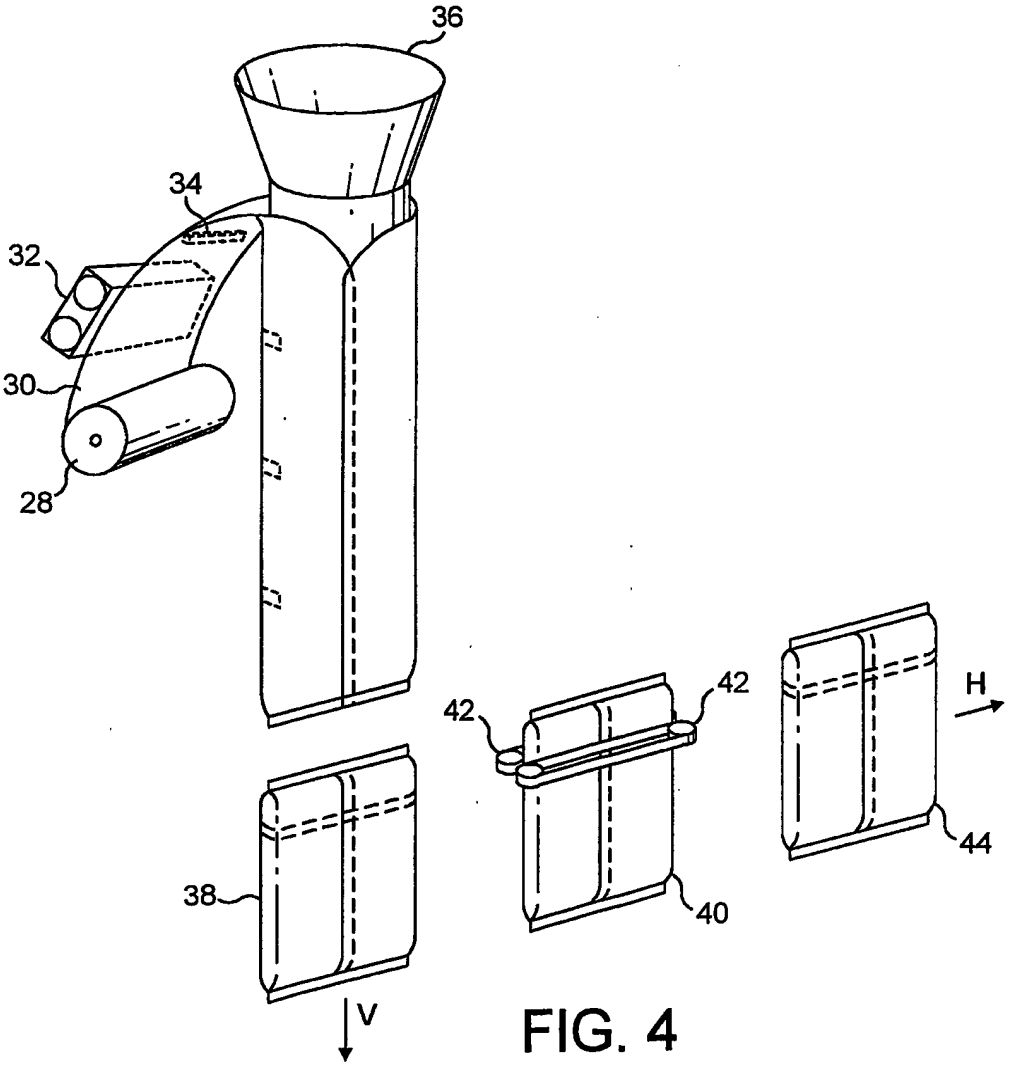

FIG. 4

INTERNATIONAL SEARCH REPORT

Internati pplication No
PCT/GB 03/03449

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65B9/08 B65B9/20 B65B61/18 B31B19/90

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65B B31B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	US 2002/139704 A1 (BUCHMAN JAMES E) 3 October 2002 (2002-10-03) page 3, paragraph 30 - paragraph 37; figure 5 page 4, paragraph 44	1-20,22
A	FR 2 772 004 A (FLEXICO FRANCE SARL) 11 June 1999 (1999-06-11) abstract; figure 1	1-20,22
A,P	NL 1 020 510 C (CFS WEERT B V) 14 January 2003 (2003-01-14) abstract	2,3
A	US 6 085 491 A (BOIS HENRI GEORGES) 11 July 2000 (2000-07-11) abstract; figure 1	4-6

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
1 December 2003	05/12/2003

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Damiani, A

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Internatic pplication No
PCT/GB 03/03449

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 151 868 A (MATTHEWS DAVID J) 28 November 2000 (2000-11-28) abstract; figure 1	1-20,22

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Inter... ...al application No.
PCT/GB 03/03449

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 21, 23
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No. PCT/GB 03 /03449

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 21, 23

Reference to drawings (Rule 6.2 (a) PCT)

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Internati· ·plication No
PCT/GB 03/03449

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